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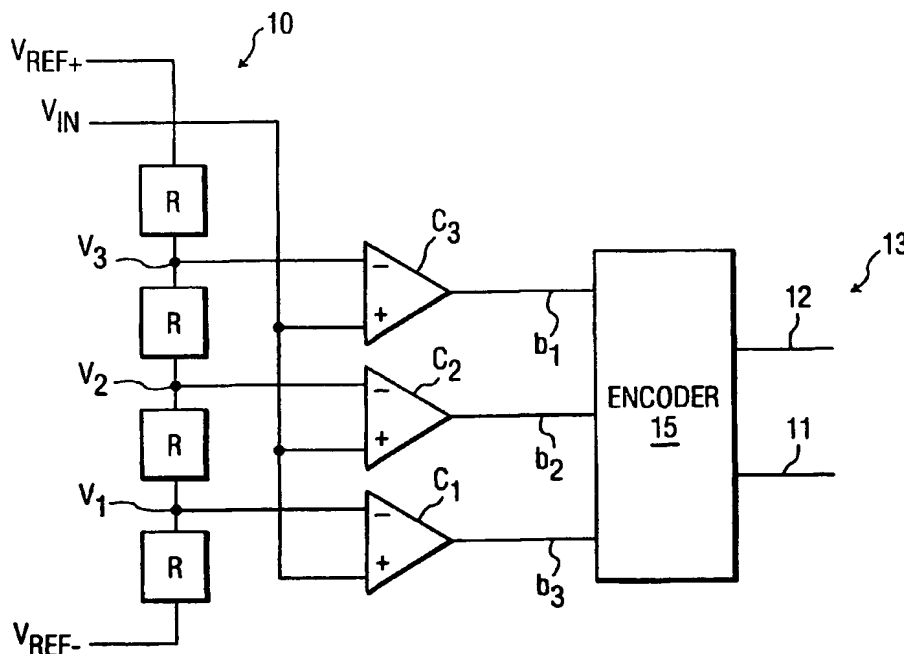
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Declaration under Rule 4.17:

— as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for all designations

[Continued on next page]

(54) Title: **NON-LINEAR DISTRIBUTION OF VOLTAGE STEPS IN FLASH-TYPE A/D CONVERTERS**



(57) Abstract: A method, apparatus, and system for converting an input voltage  $V_{IN}$  to a digital output. A comparison of  $V_{IN}$  with reference voltages in one or more flash-type analog-to-digital (A/D) converters generates the digital output representing  $V_{IN}$ . If one A/D converter is used, the A/D converter is non-linear. If more than one A/D converter are used, the A/D converters are each linear.



**Published:**

— with international search report

**(88) Date of publication of the international search report:**  
19 August 2004

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

## INTERNATIONAL SEARCH REPORT

Internal

Application No

PCT,

03/05507

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 7 H03M1/12 H03M1/36

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
IPC 7 H03M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the International search (name of data base and, where practical, search terms used)

EPO-Internal

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 399 303 A (BROOKTREE CORP) 28 November 1990 (1990-11-28) column 1 - column 6; figures 1-4 -----	1,2,4-9, 11-14
X	EP 0 332 118 A (YAMAHA CORP) 13 September 1989 (1989-09-13) column 1 - column 4; figure 2 -----	1,3,8,10
X	US 5 066 952 A (KOERNER STEVE J) 19 November 1991 (1991-11-19) column 1 - column 5; figure 1 -----	1,5-8, 12-14

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

## \* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

18 February 2004

Date of mailing of the international search report

01.06.04

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Morrish, I

# INTERNATIONAL SEARCH REPORT

In

nal application No.  
T/IB 03/05507**Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)**

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:  
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

**Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)**

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-14

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-14

Non-linear Flash A/D converter which has non-linear voltage reference points connected to the comparators to perform non-linear conversion.

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2. claims: 15-28

Multitple A/D converters for decoding a signal. The input voltage is split into several parallel paths, each path is scaled and then passed to a linear flash AD converter. Each path has different scales for the voltage references for the comparators. An encoder then links all the paths together to produce a digital output.

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## INTERNATIONAL SEARCH REPORT

Internat

Application No

PCT,

03/05507

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